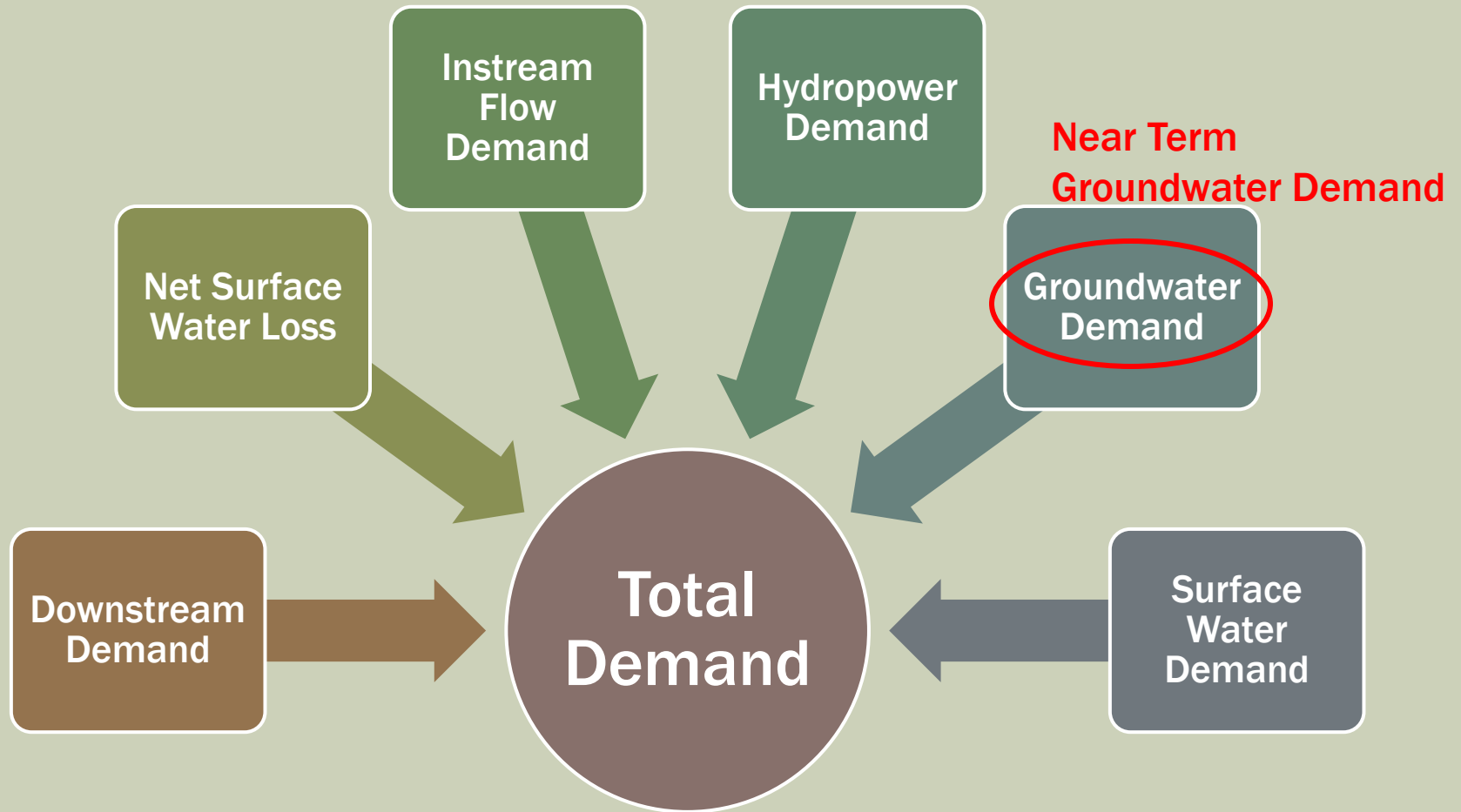


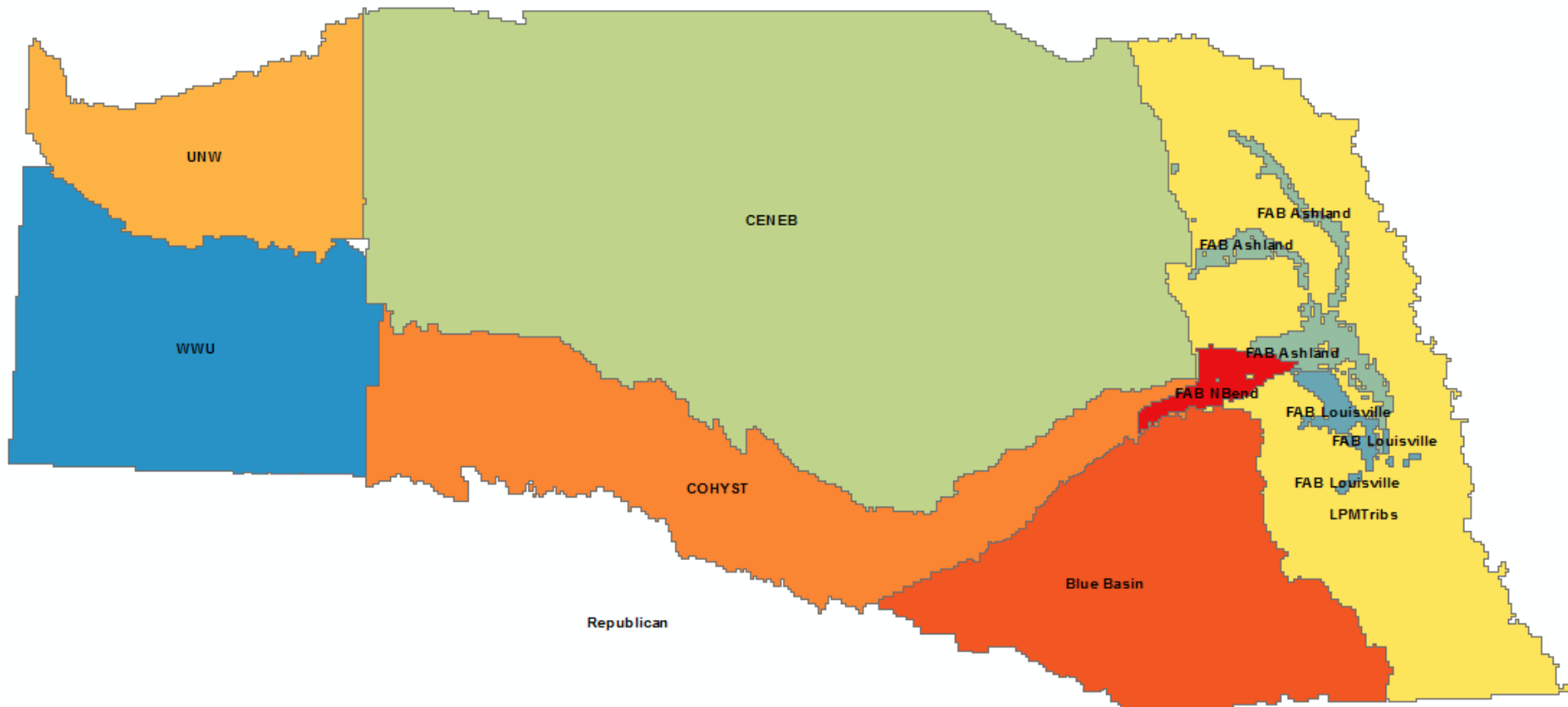
NEAR TERM GROUNDWATER DEPLETION

A Component
of Total
Demand as
Calculated for
INSIGHT

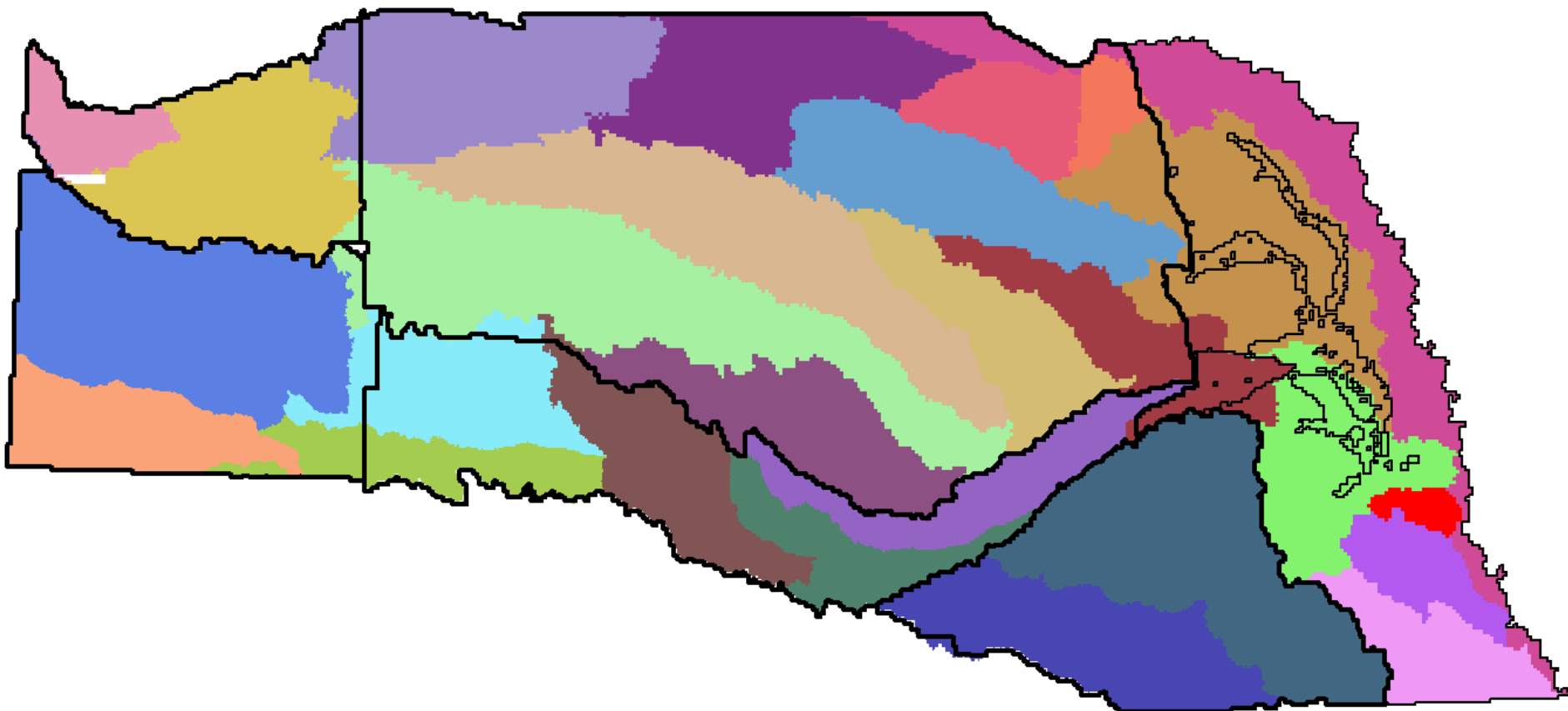
OUTLINE



DIFFERENT GW MODELS USED IN INSIGHT PROJECT



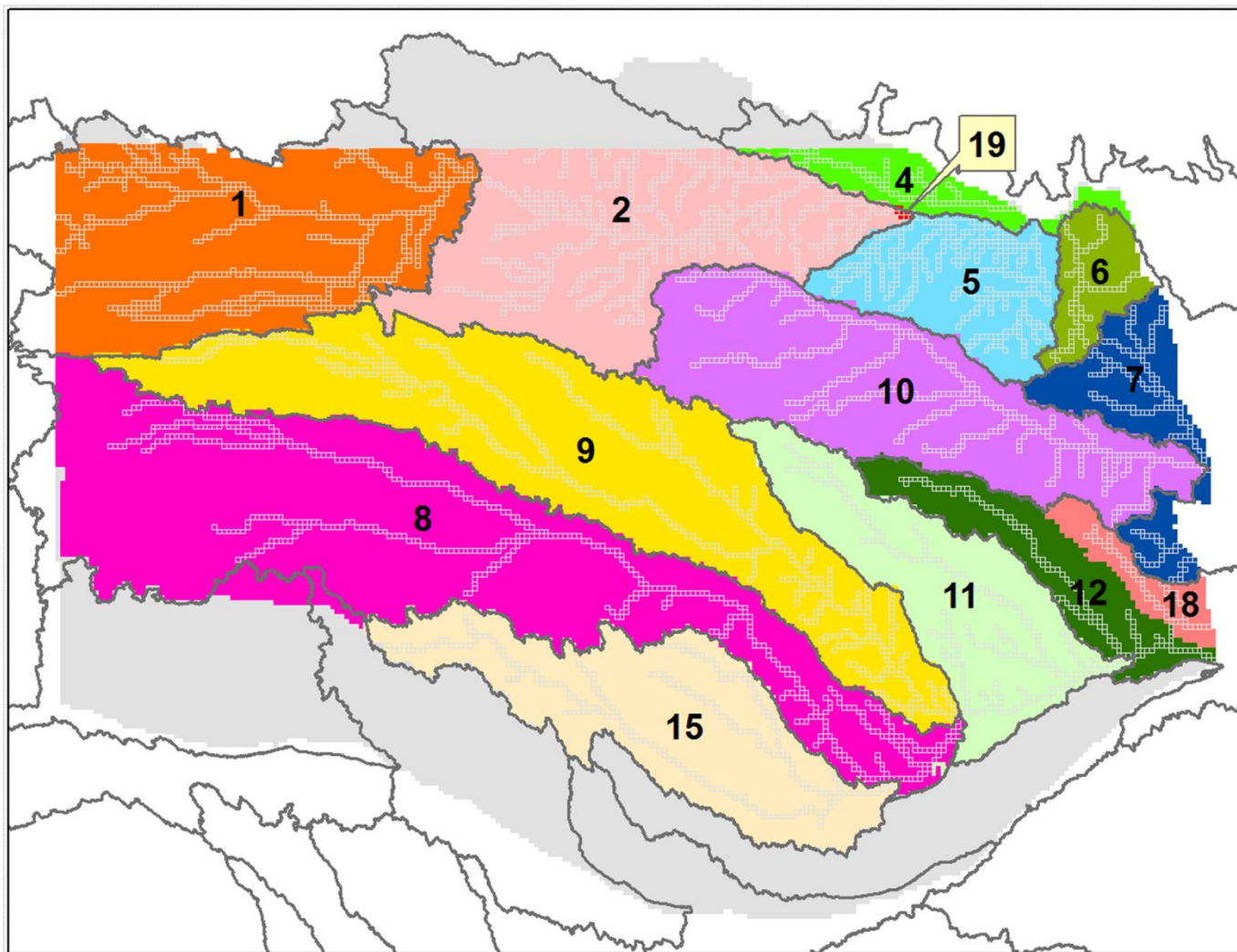
INSIGHT SUB-BASIN BASED MODEL ZONES



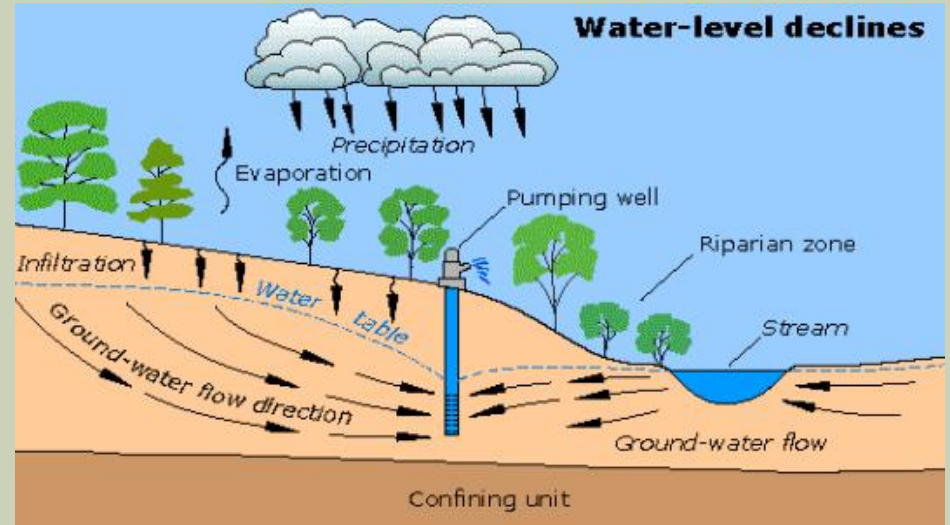
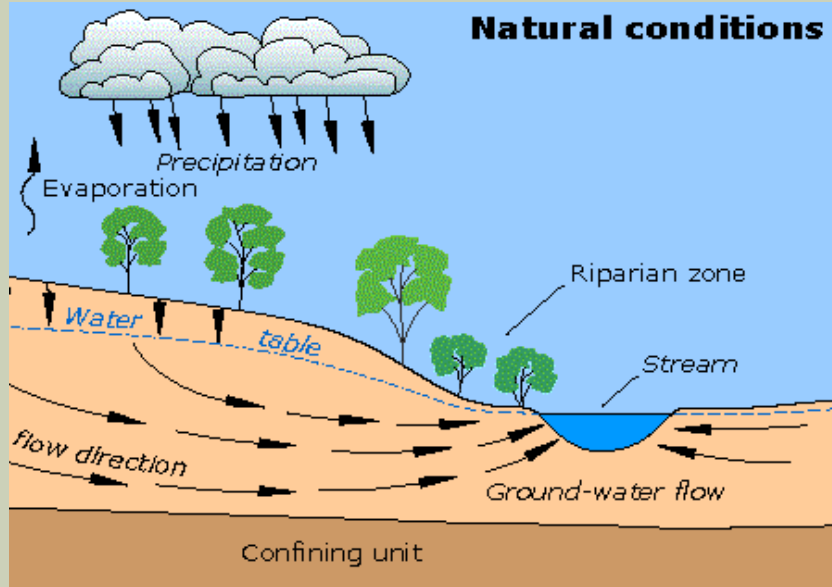
INSIGHT Sub-basin



INSIGHT SUB-BASIN BASED MODEL ZONES



GW DEPLETION CONCEPT



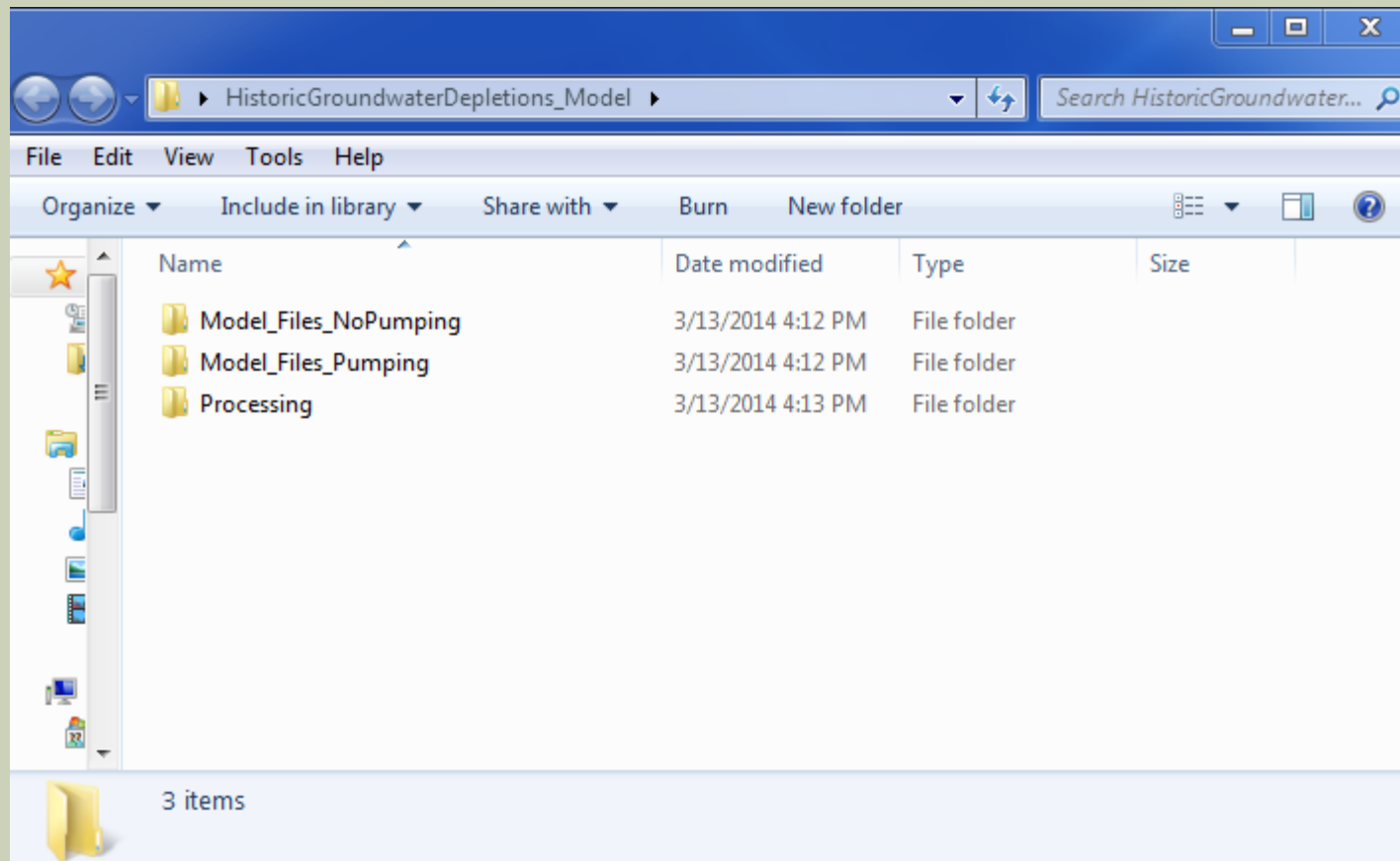
CALCULATION-NUMERICAL APPROACH

- Calculation of historic groundwater depletion
 - How to calculate stream baseflow reduction and to what should it be compared against?
- **No Pumping** (Baseline scenario) model version
 - Historic land use data included
 - Only surface water available for crop irrigation
 - If crop water demand is not met by irrigated surface water, it remains as it is
- **Pumping** (GW Irrigation Development) model version
 - Historic land use data included
 - Both surface water and groundwater available for crop irrigation
 - If crop water demand is not met by irrigated surface water, groundwater irrigation takes place to full crop water demand

BASIC PROCEDURE

1. Extend the Baseline model time-frame to year 2012
2. Prepare two versions of extended groundwater model
 - model with historic groundwater pumping (**Pumping** version)
 - model with no groundwater pumping (**NoPumping** version)
3. Run the **MODFLOW** program
4. Run **ZoneBudget** program to produce the zonal water budget
 - zones in a model based on INSIGHT sub-basins
5. Post-process the **ZoneBudget** outputs
6. Calculate annual, peak and non-peak groundwater depletion volume by sub-basin zones
7. Addition of groundwater depletion volumes of zones between two models that falls within a same sub-basin

FOLDER STRUCTURE IN SERVER AND FTP SITE



PROCEDURE

1. Open output file after running zone budget program

PERIOD	STEP	ZONE	STORAGE	CONSTANT HEAD	WELLS	ET	HEAD DEP BOUNDS	RECHARGE	STREAM LEAKAGE			STORAGE	CONSTANT HEAD	WELLS	ET	HEAD DEP BOUNDS	RECHARGE	STREAM LEAKAGE
1	1	1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.91E+06	4.22E+07	4.30E+06			0.00E+00	0.00E+00	4.03E+04	1.11E+07	0.00E+00	0.00E+00	3.02E+07
1	1	2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.35E+07	9.82E+05			0.00E+00	0.00E+00	3.62E+04	1.98E+07	0.00E+00	0.00E+00	1.74E+07
1	1	4	0.00E+00	1.69E+04	0.00E+00	0.00E+00	0.00E+00	5.71E+06	6.51E+04			0.00E+00	9.18E+05	0.00E+00	3.43E+06	0.00E+00	0.00E+00	1.45E+06
1	1	5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E+07	1.13E+05			0.00E+00	0.00E+00	0.00E+00	1.04E+07	0.00E+00	0.00E+00	1.04E+07
1	1	6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.26E+06	0.00E+00			0.00E+00	0.00E+00	0.00E+00	2.23E+06	0.00E+00	0.00E+00	4.54E+06
1	1	7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.56E+04	1.65E+07	2.37E+05			0.00E+00	0.00E+00	1.29E+05	4.40E+06	2.67E+06	0.00E+00	6.94E+06
1	1	8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.21E+06	7.25E+07	5.75E+06			0.00E+00	0.00E+00	6.56E+04	2.63E+07	0.00E+00	0.00E+00	5.60E+07
1	1	9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.34E+07	2.26E+06			0.00E+00	0.00E+00	4.43E+04	2.12E+07	0.00E+00	0.00E+00	5.33E+07
1	1	10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.64E+07	6.02E+05			0.00E+00	0.00E+00	8.82E+03	2.94E+07	1.06E+05	0.00E+00	2.79E+07
1	1	11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.44E+07	2.05E+05			0.00E+00	0.00E+00	2.53E+04	1.44E+07	0.00E+00	0.00E+00	2.56E+07
1	1	12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.34E+07	3.99E+05			0.00E+00	0.00E+00	8.31E+04	8.37E+06	0.00E+00	0.00E+00	1.48E+07
1	1	15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.49E+07	5.85E+05			0.00E+00	0.00E+00	2.25E+05	2.16E+07	0.00E+00	0.00E+00	1.70E+07
1	1	18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.44E+04	4.67E+06	1.84E+05			0.00E+00	0.00E+00	2.15E+04	2.63E+06	4.87E+05	0.00E+00	2.30E+06
1	1	19	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.15E+05	8.75E+03			0.00E+00	0.00E+00	0.00E+00	2.50E+05	0.00E+00	0.00E+00	4.23E+04
2	1	1	3.19E+07	0.00E+00	0.00E+00	0.00E+00	9.91E+06	9.97E+06	4.50E+06			1.53E+04	0.00E+00	4.13E+04	1.11E+07	0.00E+00	0.00E+00	4.99E+07
2	1	2	1.33E+07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.19E+07	1.00E+06			1.76E+06	0.00E+00	7.92E+04	1.97E+07	0.00E+00	0.00E+00	1.73E+07
2	1	4	1.27E+06	1.74E+04	0.00E+00	0.00E+00	0.00E+00	4.41E+06	6.76E+04			1.68E+04	9.10E+05	0.00E+00	3.42E+06	0.00E+00	0.00E+00	1.43E+06
2	1	5	8.24E+06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.21E+07	1.33E+05			6.64E+05	0.00E+00	0.00E+00	1.04E+07	0.00E+00	0.00E+00	1.02E+07
2	1	6	3.66E+06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.57E+06	0.00E+00			0.00E+00	0.00E+00	0.00E+00	2.23E+06	0.00E+00	0.00E+00	4.52E+06
2	1	7	8.25E+06	0.00E+00	0.00E+00	0.00E+00	2.55E+04	8.40E+06	2.41E+05			1.99E+05	0.00E+00	1.57E+05	4.40E+06	2.66E+06	0.00E+00	6.90E+06
2	1	8	4.66E+07	0.00E+00	0.00E+00	0.00E+00	9.22E+06	2.52E+07	5.83E+06			3.84E+03	0.00E+00	9.07E+04	2.63E+07	0.00E+00	0.00E+00	5.55E+07
2	1	9	3.85E+07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.46E+07	2.27E+06			6.37E+04	0.00E+00	7.38E+04	2.12E+07	0.00E+00	0.00E+00	5.29E+07
2	1	10	1.97E+07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.94E+07	6.04E+05			2.82E+06	0.00E+00	1.10E+04	2.94E+07	1.06E+05	0.00E+00	2.77E+07
2	1	11	2.76E+07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.60E+07	2.69E+05			2.22E+04	0.00E+00	5.22E+04	1.43E+07	0.00E+00	0.00E+00	2.49E+07
2	1	12	1.51E+07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.17E+06	4.17E+05			0.00E+00	0.00E+00	1.26E+05	8.37E+06	0.00E+00	0.00E+00	1.47E+07
2	1	15	2.39E+07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.09E+07	6.11E+05			1.45E+03	0.00E+00	3.23E+05	2.15E+07	0.00E+00	0.00E+00	1.69E+07
2	1	18	2.32E+06	0.00E+00	0.00E+00	0.00E+00	1.44E+04	2.33E+06	1.88E+05			0.00E+00	0.00E+00	3.28E+04	2.63E+06	4.87E+05	0.00E+00	2.28E+06
2	1	19	1.84E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.54E+04	8.75E+03			0.00E+00	0.00E+00	0.00E+00	2.50E+05	0.00E+00	0.00E+00	4.18E+04
2	2	1	3.16E+07	0.00E+00	0.00E+00	0.00E+00	9.92E+06	9.97E+06	4.49E+06			1.43E+04	0.00E+00	4.13E+04	1.11E+07	0.00E+00	0.00E+00	4.96E+07
2	2	2	1.32E+07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.19E+07	1.02E+06			1.73E+06	0.00E+00	7.92E+04	1.97E+07	0.00E+00	0.00E+00	1.72E+07
2	2	4	1.24E+06	1.81E+04	0.00E+00	0.00E+00	0.00E+00	4.41E+06	7.02E+04			1.65E+04	9.02E+05	0.00E+00	3.41E+06	0.00E+00	0.00E+00	1.41E+06
2	2	5	8.05E+06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.21E+07	1.46E+05			6.59E+05	0.00E+00	0.00E+00	1.04E+07	0.00E+00	0.00E+00	1.00E+07
2	2	6	3.63E+06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.57E+06	0.00E+00			0.00E+00	0.00E+00	0.00E+00	2.23E+06	0.00E+00	0.00E+00	4.49E+06
2	2	7	8.18E+06	0.00E+00	0.00E+00	0.00E+00	2.54E+04	8.40E+06	2.46E+05			1.96E+05	0.00E+00	1.57E+05	4.40E+06	2.66E+06	0.00E+00	6.87E+06
2	2	8	4.61E+07	0.00E+00	0.00E+00	0.00E+00	9.22E+06	2.52E+07	5.92E+06			3.11E+03	0.00E+00	9.07E+04	2.63E+07	0.00E+00	0.00E+00	5.50E+07
2	2	9	3.81E+07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.46E+07	2.28E+06			5.23E+04	0.00E+00	7.38E+04	2.12E+07	0.00E+00	0.00E+00	5.26E+07
2	2	10	1.94E+07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.94E+07	6.06E+05			2.79E+06	0.00E+00	1.10E+04	2.94E+07	1.07E+05	0.00E+00	2.75E+07
2	2	11	2.70E+07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.60E+07	3.40E+05			2.04E+04	0.00E+00	5.22E+04	1.43E+07	0.00E+00	0.00E+00	2.44E+07
2	2	12	1.48E+07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.17E+06	4.35E+05			0.00E+00	0.00E+00	1.26E+05	8.36E+06	0.00E+00	0.00E+00	1.45E+07
2	2	15	2.38E+07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.09E+07	6.40E+05			1.37E+03	0.00E+00	3.23E+05	2.15E+07	0.00E+00	0.00E+00	1.68E+07
2	2	18	2.29E+06	0.00E+00	0.00E+00	0.00E+00	1.45E+04	2.33E+06	1.93E+05			0.00E+00	0.00E+00	3.28E+04	2.62E+06	4.86E+05	0.00E+00	2.26E+06
2	2	19	1.76E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.54E+04	8.76E+03			0.00E+00	0.00E+00	0.00E+00	2.50E+05	0.00E+00	0.00E+00	4.12E+04
2	3	1	3.14E+07	0.00E+00	0.00E+00	0.00E+00	9.92E+06	9.97E+06	4.48E+06			1.33E+04	0.00E+00	4.13E+04	1.11E+07	0.00E+00	0.00E+00	4.94E+07
2	3	2	1.30E+07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.19E+07	1.03E+06			1.70E+06	0.00E+00	7.92E+04	1.96E+07	0.00E+00	0.00E+00	1.72E+07
2	3	4	1.20E+06	1.88E+04	0.00E+00	0.00E+00	0.00E+00	4.41E+06	7.15E+04			1.62E+04	8.92E+05	0.00E+00	3.40E+06	0.00E+00	0.00E+00	1.40E+06
2	3	5	7.88E+06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.21E+07	1.58E+05			6.52E+05	0.00E+00	0.00E+00	1.04E+07	0.00E+00	0.00E+00	9.91E+06
2	3	6	3.61E+06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.57E+06	0.00E+00			0.00E+00	0.00E+00	0.00E+00	2.23E+06	0.00E+00	0.00E+00	4.47E+06
2	3	7	8.12E+06	0.00E+00	0.00E+00	0.00E+00	2.53E+04	8.40E+06	2.51E+05			1.93E+05	0.00E+00	1.56E+05	4.40E+06	2.66E+06	0.00E+00	6.83E+06
2	3	8	4.55E+07	0.00E+00	0.00E+00	0.00E+00	9.22E+06	2.52E+07	6.00E+06			2.42E+03	0.00E+00	9.07E+04	2.62E+07	0.00E+00	0.00E+00	5.46E+07
2	3	9	3.78E+07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.46E+07	2.29E+06			4.48E+04	0.00E+00	7.38E+04	2.11E+07	0.00E+00	0.00E+00	5.24E+07

PROCEDURE

2. Calculation of net rate terms (IN – OUT) of model components

Model_Files_NoPumping

NET_STORAGE	NET_CONSTANTHD	NET_WELLS	NET_ET	NET_GHB	NET_RECH	NET_STR
0.00E+00	0.00E+00	4.03E+04	1.11E+07	-9.91E+06	-4.22E+07	4.57E+07
0.00E+00	0.00E+00	3.62E+04	1.98E+07	0.00E+00	-3.35E+07	1.64E+07
0.00E+00	9.01E+05	0.00E+00	3.43E+06	0.00E+00	-5.71E+06	1.39E+06
0.00E+00	0.00E+00	0.00E+00	1.04E+07	0.00E+00	-2.00E+07	1.03E+07
0.00E+00	0.00E+00	0.00E+00	2.23E+06	0.00E+00	-6.26E+06	4.54E+06
0.00E+00	0.00E+00	1.29E+05	4.40E+06	2.64E+06	-1.65E+07	6.70E+06
0.00E+00	0.00E+00	6.56E+04	2.63E+07	-9.21E+06	-7.25E+07	5.03E+07
0.00E+00	0.00E+00	4.43E+04	2.12E+07	0.00E+00	-6.34E+07	5.11E+07
0.00E+00	0.00E+00	8.82E+03	2.94E+07	1.06E+05	-5.64E+07	2.73E+07
0.00E+00	0.00E+00	2.53E+04	1.44E+07	0.00E+00	-4.44E+07	2.54E+07
0.00E+00	0.00E+00	8.31E+04	8.37E+06	0.00E+00	-2.34E+07	1.44E+07
0.00E+00	0.00E+00	2.25E+05	2.16E+07	0.00E+00	-3.49E+07	1.65E+07
0.00E+00	0.00E+00	2.15E+04	2.63E+06	4.73E+05	-4.67E+06	2.11E+06
0.00E+00	0.00E+00	0.00E+00	2.50E+05	0.00E+00	-1.15E+05	3.36E+04
-3.19E+07	0.00E+00	4.13E+04	1.11E+07	-9.91E+06	-9.97E+06	4.54E+07
-1.15E+07	0.00E+00	7.92E+04	1.97E+07	0.00E+00	-2.19E+07	1.63E+07
-1.25E+06	8.93E+05	0.00E+00	3.42E+06	0.00E+00	-4.41E+06	1.36E+06
-7.58E+06	0.00E+00	0.00E+00	1.04E+07	0.00E+00	-1.21E+07	1.01E+07
-3.66E+06	0.00E+00	0.00E+00	2.23E+06	0.00E+00	-2.57E+06	4.52E+06
-8.05E+06	0.00E+00	1.57E+05	4.40E+06	2.64E+06	-8.40E+06	6.66E+06
-4.66E+07	0.00E+00	9.07E+04	2.63E+07	-9.22E+06	-2.52E+07	4.96E+07
-3.84E+07	0.00E+00	7.38E+04	2.12E+07	0.00E+00	-2.46E+07	5.07E+07
-1.68E+07	0.00E+00	1.10E+04	2.94E+07	1.06E+05	-3.94E+07	2.71E+07
-2.75E+07	0.00E+00	5.22E+04	1.43E+07	0.00E+00	-1.60E+07	2.46E+07
-1.51E+07	0.00E+00	1.26E+05	8.37E+06	0.00E+00	-8.17E+06	1.42E+07
-2.39E+07	0.00E+00	3.23E+05	2.15E+07	0.00E+00	-1.09E+07	1.63E+07
-2.32E+06	0.00E+00	3.28E+04	2.63E+06	4.73E+05	-2.33E+06	2.09E+06
-1.84E+04	0.00E+00	0.00E+00	2.50E+05	0.00E+00	-9.54E+04	3.31E+04
-3.16E+07	0.00E+00	4.13E+04	1.11E+07	-9.92E+06	-9.97E+06	4.51E+07
-1.14E+07	0.00E+00	7.92E+04	1.97E+07	0.00E+00	-2.19E+07	1.62E+07
-1.22E+06	8.84E+05	0.00E+00	3.41E+06	0.00E+00	-4.41E+06	1.34E+06
-7.40E+06	0.00E+00	0.00E+00	1.04E+07	0.00E+00	-1.21E+07	9.89E+06
-3.63E+06	0.00E+00	0.00E+00	2.23E+06	0.00E+00	-2.57E+06	4.49E+06
-7.99E+06	0.00E+00	1.57E+05	4.40E+06	2.64E+06	-8.40E+06	6.62E+06
-4.61E+07	0.00E+00	9.07E+04	2.63E+07	-9.22E+06	-2.52E+07	4.91E+07
-3.81E+07	0.00E+00	7.38E+04	2.12E+07	0.00E+00	-2.46E+07	5.04E+07
-1.66E+07	0.00E+00	1.10E+04	2.94E+07	1.07E+05	-3.94E+07	2.69E+07
-2.70E+07	0.00E+00	5.22E+04	1.43E+07	0.00E+00	-1.60E+07	2.41E+07
-1.48E+07	0.00E+00	1.26E+05	8.36E+06	0.00E+00	-8.17E+06	1.40E+07
-2.38E+07	0.00E+00	3.23E+05	2.15E+07	0.00E+00	-1.09E+07	1.62E+07
-2.29E+06	0.00E+00	3.28E+04	2.62E+06	4.72E+05	-2.33E+06	2.07E+06
-1.76E+04	0.00E+00	0.00E+00	2.50E+05	0.00E+00	-9.54E+04	3.24E+04
-3.14E+07	0.00E+00	4.13E+04	1.11E+07	-9.92E+06	-9.97E+06	4.49E+07

Model_Files_Pumping

NET_STORAGE	NET_CONSTANTHD	NET_WELLS	NET_ET	NET_GHB	NET_RECH	NET_STR
0.00E+00	0.00E+00	4.03E+04	1.11E+07	-9.91E+06	-4.22E+07	4.57E+07
0.00E+00	0.00E+00	3.62E+04	1.98E+07	0.00E+00	-3.35E+07	1.64E+07
0.00E+00	9.01E+05	0.00E+00	3.43E+06	0.00E+00	-5.71E+06	1.39E+06
0.00E+00	0.00E+00	0.00E+00	1.04E+07	0.00E+00	-2.00E+07	1.03E+07
0.00E+00	0.00E+00	0.00E+00	2.23E+06	0.00E+00	-6.26E+06	4.54E+06
0.00E+00	0.00E+00	1.29E+05	4.40E+06	2.64E+06	-1.65E+07	6.70E+06
0.00E+00	0.00E+00	6.56E+04	2.63E+07	-9.21E+06	-7.25E+07	5.03E+07
0.00E+00	0.00E+00	4.43E+04	2.12E+07	0.00E+00	-6.34E+07	5.11E+07
0.00E+00	0.00E+00	8.82E+03	2.94E+07	1.06E+05	-5.64E+07	2.73E+07
0.00E+00	0.00E+00	2.53E+04	1.44E+07	0.00E+00	-4.44E+07	2.54E+07
0.00E+00	0.00E+00	8.31E+04	8.37E+06	0.00E+00	-2.34E+07	1.44E+07
0.00E+00	0.00E+00	2.25E+05	2.16E+07	0.00E+00	-3.49E+07	1.65E+07
0.00E+00	0.00E+00	2.15E+04	2.63E+06	4.73E+05	-4.67E+06	2.11E+06
0.00E+00	0.00E+00	0.00E+00	2.50E+05	0.00E+00	-1.15E+05	3.36E+04
-3.19E+07	0.00E+00	4.13E+04	1.11E+07	-9.91E+06	-9.97E+06	4.54E+07
-1.15E+07	0.00E+00	7.92E+04	1.97E+07	0.00E+00	-2.19E+07	1.63E+07
-1.25E+06	8.93E+05	0.00E+00	3.42E+06	0.00E+00	-4.41E+06	1.36E+06
-7.58E+06	0.00E+00	0.00E+00	1.04E+07	0.00E+00	-1.21E+07	1.01E+07
-3.66E+06	0.00E+00	0.00E+00	2.23E+06	0.00E+00	-2.57E+06	4.52E+06
-8.05E+06	0.00E+00	1.57E+05	4.40E+06	2.64E+06	-8.40E+06	6.66E+06
-4.66E+07	0.00E+00	9.07E+04	2.63E+07	-9.22E+06	-2.52E+07	4.96E+07
-3.84E+07	0.00E+00	7.38E+04	2.12E+07	0.00E+00	-2.46E+07	5.07E+07
-1.68E+07	0.00E+00	1.10E+04	2.94E+07	1.06E+05	-3.94E+07	2.71E+07
-2.75E+07	0.00E+00	5.22E+04	1.43E+07	0.00E+00	-1.60E+07	2.46E+07
-1.51E+07	0.00E+00	1.26E+05	8.37E+06	0.00E+00	-8.17E+06	1.42E+07
-2.39E+07	0.00E+00	3.23E+05	2.15E+07	0.00E+00	-1.09E+07	1.63E+07
-2.32E+06	0.00E+00	3.28E+04	2.63E+06	4.73E+05	-2.33E+06	2.09E+06
-1.84E+04	0.00E+00	0.00E+00	2.50E+05	0.00E+00	-9.54E+04	3.31E+04
-3.16E+07	0.00E+00	4.13E+04	1.11E+07	-9.92E+06	-9.97E+06	4.51E+07
-1.14E+07	0.00E+00	7.92E+04	1.97E+07	0.00E+00	-2.19E+07	1.62E+07
-1.22E+06	8.84E+05	0.00E+00	3.41E+06	0.00E+00	-4.41E+06	1.34E+06
-7.40E+06	0.00E+00	0.00E+00	1.04E+07	0.00E+00	-1.21E+07	9.89E+06
-3.63E+06	0.00E+00	0.00E+00	2.23E+06	0.00E+00	-2.57E+06	4.49E+06
-7.99E+06	0.00E+00	1.57E+05	4.40E+06	2.64E+06	-8.40E+06	6.62E+06
-4.61E+07	0.00E+00	9.07E+04	2.63E+07	-9.22E+06	-2.52E+07	4.91E+07
-3.81E+07	0.00E+00	7.38E+04	2.12E+07	0.00E+00	-2.46E+07	5.04E+07
-1.66E+07	0.00E+00	1.10E+04	2.94E+07	1.07E+05	-3.94E+07	2.69E+07
-2.70E+07	0.00E+00	5.22E+04	1.43E+07	0.00E+00	-1.60E+07	2.41E+07
-1.48E+07	0.00E+00	1.26E+05	8.36E+06	0.00E+00	-8.17E+06	1.40E+07
-2.38E+07	0.00E+00	3.23E+05	2.15E+07	0.00E+00	-1.09E+07	1.62E+07
-2.29E+06	0.00E+00	3.28E+04	2.62E+06	4.72E+05	-2.33E+06	2.07E+06
-1.76E+04	0.00E+00	0.00E+00	2.50E+05	0.00E+00	-9.54E+04	3.24E+04
-3.14E+07	0.00E+00	4.13E+04	1.11E+07	-9.92E+06	-9.97E+06	4.49E+07

PROCEDURE

3. Calculation of groundwater depletion rate (NoPumping – Pumping)

=CENEB_NoPumping!AC41-CENEB_Pumping!AF41											
B	C	D	E	F	G	H	I	J	K	L	M
PERIOD	STEP	ZONE	STORAGE_DEPL	CHD_DEPL	WEL_DEPL	ET_DEPL	GHB_DEPL	RCH_DEPL	STR_DEPL	BetwZones	sumall
1	1	1	0.00E+00	0.00E+00	-4.03E+04	1.18E+03	-1.00E+00	0.00E+00	39020.00	3.52E+06	3523778.15
1	1	2	0.00E+00	0.00E+00	-3.62E+04	9.85E+03	0.00E+00	3.47E+03	22145.00	5.14E+06	5140843.86
1	1	4	0.00E+00	3.59E+02	0.00E+00	2.00E+00	0.00E+00	0.00E+00	1.14	1.37E+06	1366728.38
1	1	5	0.00E+00	0.00E+00	0.00E+00	2.00E+01	0.00E+00	0.00E+00	-3.60	1.45E+06	1448681.40
1	1	6	0.00E+00	0.00E+00	0.00E+00	1.40E+01	0.00E+00	0.00E+00	6205.00	1.82E+06	1822683.00
1	1	7	0.00E+00	0.00E+00	-1.29E+05	1.96E+04	2.52E+03	4.41E+03	82439.50	4.85E+06	4832570.22
1	1	8	0.00E+00	0.00E+00	-6.56E+04	2.99E+04	3.00E+00	5.33E+03	52167.00	3.26E+07	#####
1	1	9	0.00E+00	0.00E+00	-4.43E+04	3.22E+03	0.00E+00	1.26E+04	27281.00	1.74E+07	#####
1	1	10	0.00E+00	0.00E+00	-8.82E+03	1.04E+04	2.30E+00	3.87E+03	9687.80	7.25E+06	7266007.11
1	1	11	0.00E+00	0.00E+00	-2.53E+04	1.29E+03	0.00E+00	1.12E+04	14494.90	1.28E+07	#####
1	1	12	0.00E+00	0.00E+00	-8.31E+04	3.20E+03	0.00E+00	2.80E+04	51539.50	8.25E+06	8252569.95
1	1	15	0.00E+00	0.00E+00	-2.25E+05	4.89E+04	0.00E+00	3.86E+04	139870.90	1.18E+07	#####
1	1	18	0.00E+00	0.00E+00	-2.15E+04	1.86E+03	8.32E+02	7.07E+03	11667.90	2.54E+06	2539508.19
1	1	19	0.00E+00	0.00E+00	0.00E+00	7.00E-01	0.00E+00	0.00E+00	-1.06	3.77E+02	377.01
2	1	1	9.22E+02	0.00E+00	-4.13E+04	1.17E+03	-4.00E+00	0.00E+00	39020.00	3.52E+06	3523427.36
2	1	2	4.27E+04	0.00E+00	-7.92E+04	9.80E+03	0.00E+00	3.92E+03	22098.00	5.14E+06	5140748.28
2	1	4	9.40E-01	3.59E+02	0.00E+00	3.00E+00	0.00E+00	0.00E+00	1.08	1.36E+06	1363502.63
2	1	5	-1.70E+00	0.00E+00	0.00E+00	1.00E+01	0.00E+00	0.00E+00	-15.20	1.45E+06	1446293.10
2	1	6	1.80E+01	0.00E+00	0.00E+00	1.40E+01	0.00E+00	0.00E+00	6206.00	1.81E+06	1818331.00
2	1	7	2.80E+04	0.00E+00	-1.57E+05	1.97E+04	2.52E+03	4.69E+03	82462.90	4.85E+06	4832073.33
2	1	8	2.42E+04	0.00E+00	-9.07E+04	2.99E+04	4.00E+00	6.18E+03	52484.00	3.26E+07	#####
2	1	9	2.59E+04	0.00E+00	-7.38E+04	3.32E+03	0.00E+00	1.52E+04	28093.00	1.74E+07	#####
2	1	10	7.96E+02	0.00E+00	-1.10E+04	1.04E+04	2.20E+00	5.10E+03	9865.00	7.25E+06	7265796.83
2	1	11	2.58E+04	0.00E+00	-5.22E+04	1.30E+03	0.00E+00	1.19E+04	14963.90	1.28E+07	#####
2	1	12	4.24E+04	0.00E+00	-1.26E+05	3.22E+03	0.00E+00	2.61E+04	53837.50	8.25E+06	8250520.30
2	1	15	1.06E+05	0.00E+00	-3.23E+05	4.88E+04	0.00E+00	3.03E+04	140437.50	1.18E+07	#####
2	1	18	1.05E+04	0.00E+00	-3.28E+04	1.85E+03	8.32E+02	7.85E+03	11657.30	2.54E+06	2538837.90
2	1	19	-1.80E-01	0.00E+00	0.00E+00	7.00E-01	0.00E+00	0.00E+00	-0.95	3.79E+02	378.50
2	2	1	1.02E+03	0.00E+00	-4.13E+04	1.17E+03	-4.00E+00	0.00E+00	39004.00	3.52E+06	3523145.22
2	2	2	4.27E+04	0.00E+00	-7.92E+04	9.80E+03	0.00E+00	3.92E+03	22080.00	5.14E+06	5140575.28
2	2	4	8.70E-01	3.58E+02	0.00E+00	2.00E+00	0.00E+00	0.00E+00	2.09	1.36E+06	1358630.76
2	2	5	-1.60E+00	0.00E+00	0.00E+00	2.00E+01	0.00E+00	0.00E+00	-12.30	1.44E+06	1443691.10
2	2	6	-5.80E+01	0.00E+00	0.00E+00	8.20E+01	0.00E+00	0.00E+00	6209.00	1.81E+06	1813165.00

PROCEDURE

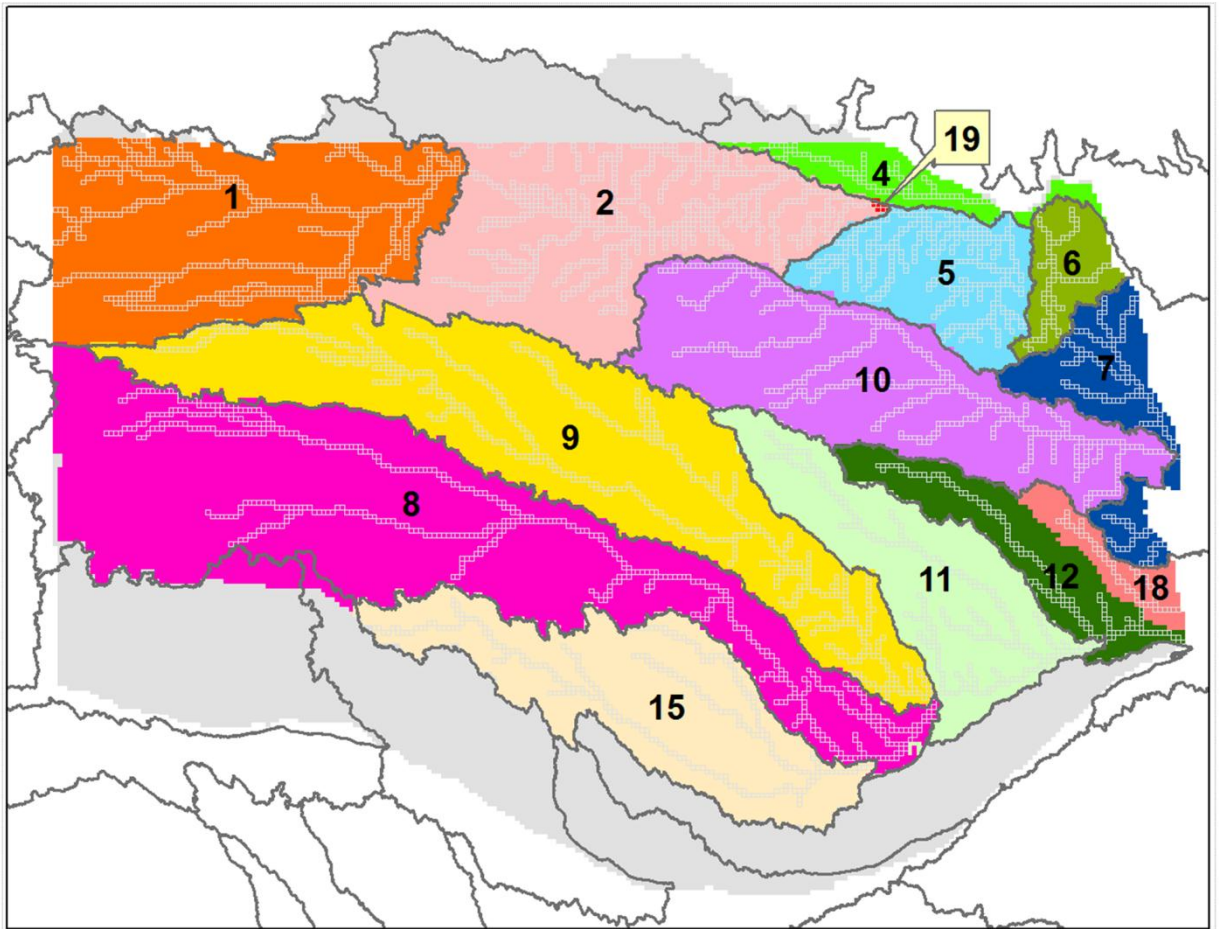
4. Groundwater depletion rate into monthly, annual, peak, and non-peak volumes - cubic feet per day to acre-feet unit

ZONE	STR_DEPL	Time	Volume (cubic feet)	12/31/1939	Monthly Calculations Cf per Month	Acre - feet per month	Zone 18- Seasons	Annual
18	11667.9	1	1.17E+04	1/30/1940	354361.961	8.13503		
18	11657.3	14.0608	1.64E+05	2/29/1940	353212.874	8.10865		
18	11644.2	16.873	1.96E+05	3/31/1940	350390.0437	8.04385		
18	11658	20.2476	2.36E+05	4/30/1940	350663.6525	8.05013		
18	11514.4	24.2971	2.80E+05	5/31/1940	350940.1767	8.05648	40.3941	
18	11523.6	29.1565	3.36E+05	6/30/1940	351202.0527	8.06249		
18	11532.2	34.9878	4.03E+05	7/31/1940	351536.6216	8.07017		
18	11545.8	41.9853	4.85E+05	8/30/1940	351639.6697	8.07254	24.2052	
18	11557.1	50.3824	5.82E+05	9/29/1940	351826.7862	8.07683		
18	11566.9	60.4589	6.99E+05	10/30/1940	351754.0698	8.07516		
18	11560.1	72.5507	8.39E+05	11/29/1940	351620.2882	8.07209		
				12/30/1940	351622.0495	8.07213		96.8956
				1/29/1941	351949.109	8.07964		
18	11564.1	14.0608	1.63E+05	3/1/1941	352521.368	8.09278		
18	11576.8	16.873	1.95E+05	3/31/1941	354197.7208	8.13126		
18	11569.6	20.2476	2.34E+05	5/1/1941	356281.9298	8.17911		
18	11631.8	24.2971	2.83E+05	5/31/1941	359296.3759	8.24831	73.0273	
18	11656	29.1565	3.40E+05	6/30/1941	361829.1433	8.30645		
18	11758	34.9878	4.11E+05	7/31/1941	366352.924	8.41031		
18	11891	41.9853	4.99E+05	8/30/1941	369530.6452	8.48326	25.2	
18	12044.2	50.3824	6.07E+05	9/30/1941	374885.6773	8.60619		
18	12325	60.4589	7.45E+05	10/30/1941	377366.4734	8.66314		
18	12536	72.5507	9.09E+05	11/30/1941	381303.9622	8.75353		
				12/30/1941	381305.8721	8.75358		100.708
				1/29/1942	387952.393	8.90616		
18	12674.8	14.0608	1.78E+05	3/1/1942	396968.145	9.11313		
18	12823.2	16.873	2.16E+05	3/31/1942	404379.2034	9.28327		
18	12990.8	20.2476	2.63E+05	5/1/1942	411276.6884	9.44161		
18	13188.5	24.2971	3.20E+05	5/31/1942	417310.6049	9.58013	81.1008	
18	13392.1	29.1565	3.90E+05	7/1/1942	421804.8536	9.68331		
18	13622.5	34.9878	4.77E+05	7/31/1942	429100.9228	9.8508		

PROCEDURE

3. Calculation of groundwater depletion rate (NoPumping – Pumping)

1	Date	Stream Depletion (ac-ft)														
2		1	2	4	5	6	7	8	9	10	11	12 + 18	15	19	2+19	
3	Jan-40	0.33542	15.4236	0.00113	0	4.33459	57.6181	36.6146	19.8741	6.95182	10.6827	19.8741	98.3216	0	15.4236	
4	Feb-40	0.33613	15.3298	2.5E-05	0	4.31193	57.6462	36.3036	20.5755	6.93803	10.7381	20.5755	99.136	0	15.3298	
5	Mar-40	0.3368	2.00836	0	0	4.2532	57.7975	35.473	20.7434	6.57169	10.0004	20.7434	99.6372	0	2.00836	
6	Apr-40	0.33751	15.204	0	0	4.26128	58.1685									
7	May-40	0.3382	15.185	0	0	4.26449	58.5525									
8	Jun-40	0.33891	1.01462	0	0	4.26586	58.8627									
9	Jul-40	0.3396	15.1577	0	0	4.26723	59.3267									
10	Aug-40	0.34031	15.1503	0	0	4.26739	59.1875									
11	Sep-40	0.34102	15.1385	0	0	4.26783	58.9558									
12	Oct-40	0.34171	15.1316	0	0	4.262	59.1957									
13	Nov-40	0.34242	15.1197	0	0	4.25247	59.5753									
14	Dec-40	0.34311	15.1198	0	0	4.2525	59.5756									
15	Jan-41	0.34382	15.0802	0	0	4.25332	61.0988									
16	Feb-41	0.34454	14.9937	0.0097	0	4.23657	63.1406									
17	Mar-41	0.34518	3.08173	0.0073	0	4.21587	64.7619									
18	Apr-41	0.34589	15.1661	0.00693	0	4.1993	66.2583									
19	May-41	0.34658	15.1471	0.0012	0	4.20603	67.5584									
20	Jun-41	0.34729	1.03976	0	0	4.21053	68.5325									
21	Jul-41	0.34798	15.0275	0	0	4.20648	70.0427									
22	Aug-41	0.34869	15.0088	0	0	4.24207	70.6697									
23	Sep-41	0.3494	14.9902	0	0	4.30205	71.7262									
24	Oct-41	0.35009	14.9715	0	0	4.29917	72.2995									
25	Nov-41	0.3508	14.9529	0	0	4.29437	73.2102									
26	Dec-41	0.35149	14.9342	0	0	4.29439	73.2105									
27	Jan-42	0.3522	14.9156	0	0	4.29539	73.6334									
28	Feb-42	0.35292	14.8969	0	0	4.29769	74.2254									
29	Mar-42	0.35356	3.15714	0	0	4.29771	74.7072									
30	Apr-42	0.35427	15.1281	0	0	4.30108	75.1636									
31	May-42	0.35496	15.1092	0	0	4.30601	75.5538									
32	Jun-42	0.35567	1.0649	0	0	4.3099	75.8441									
33	Jul-42	0.35636	14.8783	0	0	4.31262	76.3202									
34	Aug-42	0.35707	14.8596	0	0.0093	4.31512	76.5067									
35	Sep-42	0.35778	14.841	0	0.02493	4.3195	76.8232									
36	Oct-42	0.35847	14.8223	0	0.01532	4.32282	77.0193									
37	Nov-42	0.35918	14.8037	0	0	4.32789	77.3281									
38	Dec-42	0.35987	14.785	0	0	4.32791	77.3285									
39	Jan-43	0.36058	14.7664	0	0	4.32659	77.4681									
40	Feb-43	0.36129	14.7477	0.03116	0.18245	4.34147	77.6864									
41	Mar-43	0.36194	3.23255	0.07592	0.39824	4.37696	77.9744									



3. Calculation of groundwater depletion rate (NoPumping – Pumping)

Map of Nebraska showing the locations of 25 National Forests. The map is a black and white outline of the state, with various river systems and forest boundaries indicated by lines. Labels for the forests are placed throughout the state, including: Hat Creek, White River, Niobrara River Gordon to Sparks, Niobrara River Sparks to Spencer, Niobrara River Above Box Butte, Niobrara River Sparks to Niobrara, Niobrara River Box Butte to Gordon, Missouri River, Ekhorn River Above Norfolk, Ekhorn River Norfolk to Waterloo, North Loup River, Lower Loup River, Lower Platte River Above North Bend, North Platte River Above Lewellen, Middle Loup River, North Platte River Lewellen to North Platte, South Loup River, Middle Platte River Above Overton, Middle Platte River Grand Island to Duncan, Lower Platte River North Bend to Louisville, Lodgepole Creek, Frenchman Creek, Red Willow Creek, Medicine Creek, Middle Platte River Overton to Grand Island, Big Blue River, Sleeping Ute Creek, Little Nemaha River, South Platte River, Buffalo Creek, North Fork Republican River, Big Blue River, Little Nemaha River, Big Nemaha River, Republican River, Little Blue River, Platte Dog Creek, Beaver Creek, Sappa Creek, Driftwood Creek, Arkansas River, and South Fork Republican River.

ANY QUESTIONS?